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that was the first song that ever stirred me, but it left a yearning ineradicable as long as the mind lasts. Another time on the top of a small oak tree, on a bitterly cold winter day, I saw a pine finch, the only morsel of living nature in sight; the peculiar happiness of that moment will never be forgotten. The mating note of the red-winged blackbird, when it first arrives in the spring, or the tremulous note of the white-throated sparrow; at twilight the rich variety of notes of the screech owl; cold nights on the coast of Maine with the plover lined along the shore; or titmice in the pine forests of Germany;—such associations and innumerable others, appear to the memory time and time again, . . . and they are always an unexplained joy.

Perhaps such associations are hallowed merely in comparison with the tedium of life's little cares. This is very probably the case, but it in no wise lessens the joy. Man must work, he is paid by the work rather than by the hire, and his enjoyment is found in his work. But far above the plane of such enjoyment is the wonderful ecstacy produced by yearnings whose object is unknown. In human nature the wonderful thing is the multiplicity of characters, and the infinite number of changes and moods in each character. One of these is the character of the poet and naturalist. A naturalist may not be "born" one, for this is a loose expression. But he must become one in his earliest, purest and most impressionable years; let a few years go by, and the clay is too hard for the mould. Once a naturalist always a naturalist, the zeal of a naturalist never dies, but he must not be fettered in his pursuits. The cravings of which we have spoken are the poetic, spiritual side of the naturalist—the naturalist in contradiction to the *Naturforscher*. . . . One may become an excellent morphologist or physiologist, a clear elucidator of phenomena, and yet be without any poetic spirit. Or one may derive his most hallowed impressions from presentations in the laboratory, while another gets them from observation of objects in the field. One can only postulate that for certain natures vague naturalistic sensations are productive of the greatest joy. I too can testify to the keen joy experienced when after months of toil and many failures one attains the solution of a difficult problem. But in my case such a joy does not make as lasting an impression as does the pleasure from the mental states spoken of above; and surely the strength of a joy may be measured by the length of its duration.

He loved to spend many hours alone in fields and woods observing living creatures

and feeling himself to be "a modest but integral part of nature" and yet he was not a mystic nor a recluse, but a jovial and delightful comrade who took great pleasure in association with intimate friends. He had a fund of dry humor with which he lightened up serious subjects of conversation and yet on such occasions he never let himself go beyond proper and dignified bounds. He was a firm friend and a good hater—a man who was reserved and strenuous, but tender and sympathetic; and above all one whose chief motive in life was an absolute devotion to truth. His great will power was one of his most striking characteristics. His ability to concentrate all his energies upon his work was remarkable; at such times nothing diverted him and he allowed himself no relaxation. His powers of self-control in all personal relations were equally remarkable; although his nature was intense he was always master of himself. He was a strong and virile man—and yet he was not domineering nor self-willed and he preserved an exquisite balance between self-contained dignity and charming courtesy toward others. He was always kind and sympathetic, and it was from real kindness of nature, as well as from good breeding that those qualities arose which to many of his friends seemed to entitle him in a peculiar degree to "the grand old name of gentleman."

He was for a few years consciously and joyously a part of that nature which he so much loved. He has left to men the record of a life devoted to science and enlightenment, and to his family and friends the memory of a true and noble soul.

EDWIN G. CONKLIN

FORECAST OF THE BIRMINGHAM MEETING OF THE BRITISH ASSOCIATION¹

THE meeting of the British Association for the Advancement of Science, which will

¹ From the *London Times*.

open in Birmingham on September 10, will be the fifth meeting which the association has held in the metropolis of the Midlands. The first Birmingham meeting was as far back as 1839, nine years after the association was established; the Rev. W. Vernon Harcourt, F.R.S., was president, and the attendance numbered 1,438. At the second Birmingham meeting, ten years later, when the Rev. Dr. T. R. Robinson, F.R.S., was president, the attendance sank to 1,071, one of the smallest musters in the history of the association; but at the third meeting, in 1865, when Professor J. Phillips, F.R.S., was president, the attendances totalled 1,997. The last meeting held in Birmingham was in 1886, two years after the association had paid the first of its visits to the overseas empire at the invitation of the city of Montreal. As an acknowledgment of the hospitality then shown to the association, as well as of the high standard of scientific attainment in Canada, the president of the Birmingham meeting in 1886 was Sir J. William Dawson, F.R.S., principal and vice-chancellor of McGill University. Both in point of numbers and as regards the scientific interest of the proceedings, the meeting was one of the most successful in the long record of the association. The attendance numbered 2,453, and among the sectional presidents were Professor (afterwards Sir) George Darwin, F.R.S., Mr. (afterwards Sir) W. Crookes, F.R.S., Professor T. G. Bonney, F.R.S., and Major-General Sir F. J. Goldsmid.

Hopes are entertained that the forthcoming meeting will be the largest of all the Birmingham meetings. There are expectations of an attendance of over 3,000, and the program of the meeting, both on its scientific and social sides, is certainly one of a very attractive order. Appropriately enough, Sir Oliver Lodge will assume the presidential chair at the inaugural

meeting. By conservative men of science the principal of Birmingham University is regarded as decidedly heterodox in some of his views; but he has the courage of his convictions, and is not afraid, when grappling with problems of supreme human interest, to take a wide view of the scope of scientific research. How far he will allow himself to go in this direction in his presidential address is not known, but the subject of it, so far as yet defined, offers numerous possibilities, and the address is certain to be awaited with a good deal of curiosity. At present Sir Oliver Lodge's idea is to take a wide and philosophical survey of the position of science in general, incidentally dealing with the discussions and controversies relating to the existence and the functions of the ether of space, and to the physical continuity of which it is the chief element.

ACCOMMODATION AND ENTERTAINMENTS

Birmingham is excellently fitted to accommodate the largest congresses, even when they attain the size and complexity of the British Parliament of Science. The twelve sections composing the association will be much less scattered than in many cities in which meetings have been held. No fewer than seven of the sections will be grouped in one of the university buildings, Mason College. Excellent quarters have been found for the other sections in Queen's College, the Midland Institute, the Technical School and the Temperance Hall. The Town Hall has been allotted for the use of the association as a general reception room, and in the new Art Gallery of the Council House the Lord Mayor will hold a reception on the evening of Thursday, September 11. On the afternoon of the same day the university will confer honorary degrees on some of the most distinguished visitors, the ceremony taking

place in the new university buildings. Besides British men of science a considerable number of foreign men of science are expected to be present, among others who have accepted invitations being Professor Svante Arrhenius, of Stockholm, M. Lallemand, Professor Keibel, Professor Reinke and Professor Pringsheim. As usual, there will be various garden parties and other social functions for the entertainment of the visitors, as well as excursions on the Saturday to places within easy reach of Birmingham, including Stratford-on-Avon, Kenilworth, Worcester, Malvern and the Forest of Arden. A novel feature has been introduced into the program of entertainments in the shape of special performances at the Prince of Wales's Theater (opera), the Repertory Theater (modern drama) and the Kinemacolor Theater.

These festivities, of course, will be merely incidental to the serious work of the meeting, a permanent and valuable memento of which will be the handbook to the Birmingham district which is being prepared under the editorship of Dr. Auden. Mr. Neville Chamberlain is contributing to this handbook a section on town-planning, and a new and ingenious series of maps is being prepared for it under the direction of Professor Lapworth, F.R.S. Two evening discourses will be delivered on Friday, September 12, and Tuesday, September 16, the lecturer on the first occasion being Sir Henry H. Cunynghame, K.C.B., who will take for his subject "Explosions in Mines and the Means of preventing them"; while the lecturer on the second occasion will be Dr. A. Smith Woodward, F.R.S., who will treat of "Missing Links among Extinct Animals." Five lectures have been arranged by the council at the Digbeth Institute for citizens who are not members of the association. The first of these, "The Decorative Art of Sav-

ages," will be given by Dr. A. C. Haddon, F.R.S., on Thursday, September 11, at 8 P.M. Other lectures will be "The Panama Canal," by Dr. Vaughan Cornish; "Heredity in Relation to Man," by Dr. Leonard Doncaster; "The Microscopic Structure of Metals," by Dr. W. Rosenhain, and "Radio-activity," by Dr. F. Soddy, F.R.S. For the following particulars of the sectional proceedings we are indebted to the sectional presidents and recorders.

THE WORK OF THE SECTIONS

Section A (Mathematical and Physical Science) will have for its president Dr. H. F. Baker, F.R.S. He will probably speak of the relations of pure mathematics to the ordinary activities of life, trying to indicate what seem to him the justifications of a serious study of the subject, and thence proceeding to an attempt to set before those who have some mathematical knowledge an idea of the extent and present promise of the subject, by referring to some of the leading problems and their interconnection. During the week of the meeting the section will engage in several important discussions. Professor A. E. H. Love, Professor E. Rutherford and Professor Pringsheim have promised contributions to a discussion on radiation; mathematical geography will be the subject of a joint discussion with the geographical section; the investigation of complex stress distribution will be discussed with the engineering section; and there will also be a discussion on non-Euclidean geometry. Among individual papers one on lightning and protection from it will be presented by Sir J. Larmor, another on atmospheric pollution has been promised by Dr. J. S. Owens, while the dynamics of evolution will be discussed by Mr. A. J. Lotka.

The president of Section B (Chemistry)

will be Professor W. Palmer Wynne, F.R.S. His address will deal mainly with some problems and aspects of organic chemistry. A subject of national importance which will be discussed by the section is the economical use of coal and fuels derived therefrom. Among others who are expected to take part in the discussion are Professor Armstrong, Dr. Beilby, Professor Bone, Dr. Wheeler, Dr. M. G. Christie, Dr. Colman, Mr. J. H. Yates, Mr. J. Bond and Mr. R. Threlfall. The discussion will cover gas producers and the use of gas, coking and by-product recovery from small coal, gas fires and their efficiency. Other discussions have been arranged on radio-active elements and a periodic law, to be opened by Professor F. Soddy, and the significance of optical properties. Several metallurgical papers will be presented to the section, including one by Professor E. Cohen, of Utrecht, on strain diseases in metals.

Professor Edmund J. Garwood will preside over Section C (Geology), and in his address will probably touch on the conditions under which certain sedimentary rocks were deposited, especially those laid down during lower carboniferous times. A large number of papers have been promised for the section, among them one by Mr. V. C. Illing on recent discoveries in the Stockingford Shales, near Nuneaton, and another by Mr. F. G. Meacham on the probable development of the South Staffordshire coalfields to the west of the Western Boundary Fault and to the Shropshire Fault and the Severn Valley Fault, with some notes on the probable conditions of mining in the new area. The district round Birmingham offers exceptionally good opportunities for geological excursions, and these will be made the great feature of the sectional proceedings. While the mornings will be given up to the reading of papers, the afternoons will be given

up to short excursions, and at the close of the meeting there will be a three-days' excursion into Shropshire. The organization of these excursions is in the hands of perhaps the greatest authority on all this country, Professor Charles Lapworth, F.R.S. As an introduction to the excursions Professor Lapworth will address the section on the geology of the country round Birmingham immediately after Professor Garwood's presidential address.

Section D (Zoology) will be presided over by Dr. H. F. Gadow, F.R.S., who, in addition to his presidential address, will open a discussion on convergence in the mammalia. A subject of vital importance to the development of tropical Africa will be dealt with by Professor E. A. Minchin in a lecture on some aspects of the sleeping sickness problem. Among the papers promised are one by Dr. F. A. Dixey on the geographical relations of mimicry, and another by Mr. W. Bowater on heredity of melanism in lepidoptera. A discussion on mimicry will be opened by Professor E. B. Poulton. During the week a visit will be paid to the Burbage Experimental Station, by invitation of Major Hurst, to view the results of inheritance experiments. An important discussion, which will be held jointly with the physiological and botanical sections, will be opened by Professor B. Moore, F.R.S., on the subject of the synthesis of organic matter by inorganic colloids in the presence of sunlight, considered in relation to the origin of life.

GEOGRAPHY AND SOCIAL QUESTIONS

The professor of geography in University College, Reading, Dr. H. N. Dickson, will preside over Section E (Geography). His address will concern itself with the increasing recognition of the importance of human geography in the study of social and economic questions. Besides the joint

discussion with Section A on mathematical geography, there will be a discussion on the natural regions of the world, to be opened by Professor A. J. Herbertson, of Oxford University. In connection with the former subject the work of the Ordnance Survey, which has lately been submitted to some severe tests, will come under consideration, and a paper of special interest will be one by Captain H. Winterbotham on the accuracy of the principal triangulation of Great Britain. Most of the papers at present promised relate to questions of home geography, but Professor J. W. Gregory will deliver a lecture on Australia and Mr. I. N. Dracopoli will give an account of his recent travels in Jubaland, British East Africa.

The Rev. P. H. Wicksteed, M.A., who will preside over Section F (Economic Science and Statistics), intends to deal in his address with the simplifications in the teaching of political economy which appear to him to follow naturally from the acceptance of the Jevonian, or marginal, theory of distribution, and a frank abandonment of the cost-of-production theory of value. He will point out the confusion which has arisen from the ambiguous use of the term "marginal"—sometimes to signify the least favorable conditions under which an industry is pursued or the least efficient individual who pursues it, and sometimes to signify the dependence of the exchange value of any one of a group of indistinguishable individuals upon the contraction or expansion of their number. An attempt will be made to show that many of the categories and distinctions which still hold a prominent place in the text-books—such as the special laws of rent, interest, and wages, the treatment of buyers and sellers as opposed groups, the conception of increasing and diminishing returns as rival principles that divide the field of industry

between them—should either be abandoned or reduced to a secondary position. No attempt will be made to introduce any new principles, or to defend the "marginal" theory against actual or possible attack; Mr. Wicksteed will simply endeavor to develop the modifications in the methods of teaching and systematic exposition which, in his opinion, follow upon adoption of the theory.

The chief subjects which will come under consideration in the subsequent proceedings of the section are the cost of living, inland waterways, and trade unions in relation to profit-sharing and co-partnership. The discussion on the second of these subjects promises to be specially interesting. Lord Shuttleworth and Sir J. P. Griffith are among those who have promised to read papers, while Mr. Neville Chamberlain and Sir J. Brunner are among those who are expected to speak on the subject. A paper by Professor S. J. Chapman will deal with progressive taxation, and Professor A. W. Kirkaldy will consider the economic effects of the opening of the Panama Canal. Professor A. L. Bowley will contribute to the discussion on the cost of living a paper on the relation between wholesale and retail prices, with special reference to working-class expenditure, and Mr. Cuthbertson will contribute a paper on working men's budgets.

ELECTRIC RAILWAYS AND WIRELESS SIGNALS

In Section G (Engineering) the presidential chair will be occupied by Professor Gisbert Kapp. His address will deal with the electrification of main lines of railway. The treatment will be non-mathematical, and will be theoretical only in so far as it is necessary to develop certain features on a scientific basis. In the main the address will be a statement of what has actually been accomplished in this country and on the continent, including technical details

of lines and electromotives, tables of weights, speeds, acceleration, etc. The electromotives of the Loetschberg Tunnel line just opened will be among those dealt with in the address. The committee on gaseous explosions will present its report during the meeting, and among many individual contributors to the proceedings will be Professor Marchant with a paper on some effects of atmospheric conditions on wireless signals; Professor Howe, who will discuss the nature of the electro-magnetic rays employed in radio-telegraphy and the mode of their propagation; Mr. F. W. Lancaster, who will deal with the internal-combustion engine as applied to railway locomotives and will also have something to say about aeronautics; and Professor Burstall, who has promised a paper on solid, liquid and gaseous fuel.

The administrative value of anthropology will be the subject of Sir Richard Temple's presidential address to Section H (Anthropology). He proposes first to explain the nature and scope of the science as at present understood, the mental equipment necessary for the useful pursuit of it, and the methods by which it can be successfully studied. Next he proposes to deal with the extent and nature of the British Empire, the kind of knowledge of the alien populations within its boundaries required by persons of British origin who would administer the empire with benefit to the people dwelling in it, and the importance to such persons of acquiring that knowledge. Lastly he proposes to note the steps taken or suggested by the Royal Anthropological Institute and the universities of Cambridge and Oxford towards the supply of the knowledge of mankind necessary for sound imperial administration, which, to his mind, is the practical result of the studies of anthropologists. The programme of papers to be submitted to the section in-

cludes communications from Dr. H. R. Rivers on sun cult and megaliths in Oceania, and from Dr. Landtman on the ideas of the Kiwai Papuans regarding the soul. A contribution with an important bearing on the history of human sacrifice will be a description by Mr. J. H. Powell of the ceremony of hook-swinging in India, with lantern illustrations. The influence of geographical environment on religious development in northern Asia will be the subject of consideration by Miss Czaplicka, while Major Tremearne will deal with the magic of the Nigerian Hausas.

ARCHEOLOGY AND PHYSIOLOGY

British archeology will be well represented, as also will the results of archeological research in other parts of the world. Dr. Capitan, of Paris, who will be among the foreign guests, will describe paleolithic paintings recently discovered in the south of France; Professor Flinders Petrie will describe the results of his last season's work; and Dr. T. Ashby, of the British School at Rome, will present a report on a recent examination of the archeological remains in connection with the Appian Way and some fresh material bearing on the system of aqueducts in Rome. A paper of great importance as an example of the statistical method will be presented by Professor H. G. Fleure and Mr. T. C. James, dealing with the physical characters of the people of Wales and the borders.

The president of Section I (Physiology) will be Dr. F. Gowland Hopkins, F.R.S. During the meeting the section will receive the report of its committee on anæsthetics, in connection with which Sir Frederic Hewitt will speak on the subject of the state regulations of anæsthetics. The feature of the proceedings will be the number of joint meetings with other sections, demonstrating the close relation between dif-

ferent branches of science. There will be a meeting with the agricultural section to discuss the physiology of reproduction, with special reference to the factors affecting fertility and sterility in livestock. Reference has already been made to the joint meeting with the zoological and botanical sections. It is hoped to arrange a joint meeting with the chemical section for a discussion on fermentation. Finally the subsection of Psychology will hold a joint meeting with the Educationists. In individual papers Mr. W. McDougall will discuss the theory of laughter; Miss M. Smith and Mr. McDougall will communicate a paper on memory and habit; Dr. J. L. McIntyre will discuss the effects of practise on the memory of school children; Mr. Stanley Wyatt will report the results of some investigations into the reliability of children's testimony; and Mr. T. H. Pear will report on recent experiments regarding the psychology of testimony.

Section K (Botany) will present the rare, if not the unique, spectacle in the history of the association of being presided over by a lady. In her address to the section Miss Ethel Sargant will deal with the subject of plant embryology, considering recent work on the subject and its bearing on various morphological problems. A semi-popular lecture will be delivered by Professor W. H. Land, F.R.S., on Epiphyllous Vegetation, and there will be a joint discussion with the agricultural section on problems in barley production. A joint meeting, as already stated, has been arranged with the zoologists and physiologists. Like the zoologists the botanists will engage in an excursion to the Burbage Experimental Station, and another excursion will be made to Sutton Park.

EDUCATIONAL SCIENCE

Principal E. H. Griffiths will preside

over Section L (Educational Science). In preparing his address his object has been to make an inquiry as to the general feeling with regard to the success of our educational system, with special reference to primary education. He has collected the opinions of business men and teachers and has found the prevailing atmosphere to be one of pessimism. Venturing further afield he has made detailed inquiries of all the directors of education in the kingdom. Replies have been received from 112 directors, representative of every kind of authority in all parts of England and Wales. These replies are confidential, but they provide the basis for certain conclusions which will be set out in the address and which will, it is hoped, be found useful at a time like the present, when it seems as though our educational system is in the melting pot. Principal Griffiths will urge in his address that we are making the mistake of over-estimating knowledge and under-estimating character; that it would be better if we could model our educational system more on the boy scout movement, that is, cultivate character and intelligence until the desire for knowledge is established. Touching briefly on matters connected with secondary and higher education, he will suggest that what we want is a more careful sifting of the products of the primary schools so as to ensure that only those who are really fitted to receive secondary education should be helped by the state to obtain it; that a more careful system of selection should be established, and that when the fittest have been found more generous help should be given when necessary. As regards the universities, the danger of their passing under state control will be pointed out.

As usual, the section will follow the wise practise of discussing a few subjects of large importance rather than receiving a

multitude of disconnected papers. As an outcome of suggestions made at the Dundee meeting the section will meet with the anthropologists to discuss the educational value of museums. A discussion on the function of the modern university in the state promises to be very attractive, as the heads of the newer universities, including Sir Oliver Lodge, have promised to take part. The president of Stanford University, Mr. Alfred Mosely and Miss Burstall, of the Manchester High School for Girls, are also expected to contribute to the discussion. The discussion arranged with the psychological subsection of Section I will be concerned with the general question of the need for research in education, and with the specific researches which have been made into the vexed subject of the psychology of spelling. Two other discussions will be concerned with manual work in education and the registration of schools. The importance of the latter question was brought out by a committee at the Dundee meeting, while the importance attached to manual training is shown by the new emphasis which is now being laid on it in educational practise.

Professor T. B. Wood will preside over Section M (Agriculture). In his address he proposes to review the results of twenty years' work in agricultural science, to point out the successes and failures, to discuss the reasons for success or failure, and to endeavor therefrom to make suggestions for the future. As already stated, the section will engage in joint discussions with the botanists (on barley culture) and the physiologists (on the physiology of reproduction). Communications will also be made to the section by Sir Richard Paget, on the possibilities of partnership between landlord and tenant; Professor Fraser Story, on German forestry methods; Dr. H. B. Hutchinson and Mr. K. McLellan, on

the partial sterilization of soil by means of caustic lime; and Dr. Winifred E. Brenchley, on the weeds of arable land.

THE PRINCIPLE OF MENTAL TESTS

THE standpoint of applied psychology is implicit in the conception of mental tests. They represent a group of procedures, usually of simple technique, developed so that our knowledge of individual differences may, as Cattell puts it, be employed to guide human conduct. To justify themselves, they must earn their bread in terms of usefulness for the questions of life. In this respect they differ from the leisure-class problems of true psychological science, which are exalted above these vulgar necessities.

Two broad functions of psychological tests are distinguished. One is the measurement of changes in individuals under controlled differences in experimental conditions. The studies of Hollingworth on caffeine and of Winch on the effects of school work are among the recent examples of this type. Here the problem has usually been defined in the determination of central tendencies. To this limit, measurements can be made with comparative reliability, because the external conditions are well controllable, and the errors due to subjective factors tend, on the whole, to compensate. That is, a gain of 10 per cent. in the same individual for a second performance represents a gain of 10 per cent. in the same abilities as were concerned in the first performance. The more difficult question of just what these abilities represent in the individual case has been a secondary one for these studies, not usually coming into prominence.

It must be squarely faced, however, in the other function of psychological tests, that of measuring and interpreting the differences between individuals under similar immediate conditions. One may not say because Peter is 10 per cent. better in a memory test than Paul, that it is due to a 10 per cent. superiority in the same abilities as Paul's. It is not a difficult matter to construct tests in which consistent and certain individual differences ap-